Organizing Attention in Simple Choice Behavior

Undergraduate Thesis

Presented in partial fulfillment of the requirements for graduation with *research distinction* in Psychology in the undergraduate colleges of The Ohio State University

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Abstract

We propose that by inducing high level construal in those with a goal to diet, attention will shift toward goal congruent processing of visual stimuli. Conversely, by inducing low level construals in those with a diet goal, attention will shift toward processing salient cues in the immediate context (e.g. bright flashy packaging and/or taste). To test these hypotheses, participants completed a construal level mindset manipulation followed by a choice task that biased attention in favor of goal-relevant vs. goal-irrelevant stimuli. Results unfortunately were not consistent with hypotheses and failed to replicate past research that indicated the attention task we used influences choice behavior (Armel, Beaumel, & Rangel, 2008). We discuss reasons for this failure to replicate and make recommendations for future research.

Keywords: Self-control, construal, attention, simple choice behavior

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More than just regulating the consumption of food and drugs, self-control is why students forgo a night out with friends to study for an upcoming exam, adults report to jobs rather than the beach, thrifty shoppers spend less, and physical exercise is a hobby for millions. Accordingly, nearly every problem people experience including addictions, obesity, crime, failure in school, disease from sedentary lifestyles, sexually transmitted diseases, debt, and even unplanned pregnancy all stem from self-control failure. Because self-control has such a broad application that touches nearly every aspect of human life it has become a prominent research topic with an equally broad practical application in helping professions. Practitioners from medical and counseling fields, dieticians, social workers, educators, and even sports coaches stand to benefit from a better understanding of self-control and why the people they work with either experience positive outcomes or do not (e.g. Mischel, Rodriguez, & Shoda, 1989; Duckworth, 2011).

Self-Control Defined

The primary feature of self-control is prioritizing a distal goal, or desired end state over a salient reward that is immediately accessible in one's environment (Fujita & Carnevale, 2012). Many of the most valued and cherished things people desire are not accessible in the immediate here and now. Education, financial security, intrinsically rewarding careers, and self-image are examples of highly valued goals that unfold over time. Pursuit of such distal goals is often impaired by lesser valued rewards that are salient and immediately accessible. Take for example a dieter at a holiday meal with a distal goal of health and self image who is served a delicious slice of pie. This scenario exemplifies a typical self-control dilemma where two opposing motivations are being processed (Fujita, 2011). Although our dieter may value future health and self-image over hedonism, the accessibility of the lower valued hedonistic reward in the immediate here-and-

now challenges fidelity to the higher valued future goals. As such, self-control describes the process by which our dieter advances the higher valued distal motives of health and self-image over the lower valued proximal motives such as eat, drink, and be merry (e.g. Fujita & Carnevale, 2012). If our dieter caves in to the proximal hedonic motives, the self-control process has failed.

Research suggests a key factor in determining which of the opposing motivations dictates behavior is subjective construal (e.g. Fujita, Trope, Liberman & Levin-Sagi, 2006). Case in point, our dieter[1] may construe the dessert as either an immediate gratification, or as a threat to a higher valued yet distal goal. Drawing on construal level theory (CLT; Trope & Liberman, 2010), Fujita and Carnevale (2012) propose these types of divergent yet subjective construals influence self-control. Researchers and theorists have long since acknowledged the relevance of how people subjectively construct or construe objects and events in their minds (e.g. Ross, 1987; Griffin & Ross, 1991). Hastorf and Cantril (1954) provide one of the more popular examples. They polled groups of college students from both Princeton and Dartmouth following a rivalry football game and found that each group actually reported seeing the other team commit more cheap shots (causing injuries) than their own team. The accounts were so different the researchers said it seemed as if the two groups witnessed different games. More to the point, CLT proposes that not only do subjective construals differ between people, as with the Princeton-Dartmouth groups, but may also differ within the same person, as with our dieter (e.g. Fujita & Carnevale, 2012).

Construal Level Theory

Construals are schematic mental representations of objects and events, or personal constructs of one's reality (Kelly, 1955; e.g. Hastorf & Cantril, 1954). Reality differs from person

[1] It is worth noting that "our dieter" is used as a running example for purposes of simplicity only. Most people can relate to a dieter and understand the goals and temptations involved; however, the theoretical underpinnings delineated herein generalize to any type of person or event involving a goal or desired end state that may be challenged by the context of the situation.

to person depending on their subjective construals (e.g. Griffin & Ross, 1991). For example, one may construe a cat as a tabby or as a tiger, and even as a pet or an animal. One may also combine and modify several mental representations to form a complex construal, such as "that animal is a pet tiger." Liberman and Trope (1998) propose that the more detailed and contextualized the information one can derive from a construal the lower the level of construal; and a more abstract or broader scope of applicability of the information, the higher the level of construal. One's distinction of high- vs. low-level construal depends on how narrow or broad the information may be used. A cat, for example, may be construed as a tabby or a tiger, thus cat is a relatively higher construal than either tabby or tiger. A cat is an animal, but so too is a dog, seal, or a penguin. Thus, animal is a relatively higher construal than cat. Dogs, seals, penguins, and cats are animals, but not all animals are mammals (e.g. penguin); a mammal is then a lower level construal than animal. One can apply this same concept to any object or event so long as the scope of how the information is applicable continues to broaden into higher level construal or hones in to lower level construal. As an illustration, consider two brick masons hard at work when a passerby stops to ask what they are doing. One mason replies "laying brick." The second mason looks up and replies "building a cathedral." Although both masons were essentially performing the same task, the first brick mason honed in on a low-level construal of the event while the second mason zoomed out to high-level construal. The brick mason that proffered the high level construal had extracted essential information from the task at hand, direct experience, and assimilated that information into a higher level meaning of the event. Liberman and Trope (1998), postulate that construal of a distant future event is likely to be more abstract and consist of features that are essential to a higher level meaning of the event (building a cathedral), whereas the construal of a near future event is likely to be more concrete and include more peripheral and incidental features (laying brick). Construal is then a cognitive operation, and when that cognitive operation is

accessible, whether high- or low-level, it becomes a mindset that influences how new information will be processed in new situations (Freitas, Gollwitzer, and Trope, 2004). Trope and Liberman (2003) propose that such types of varying mindsets, or construal levels, are dimensions across psychological distance.

CLT is grounded in the concept of psychological distance. The here-and-now of direct experience serves as an egocentric anchor; as objects and situations extend from this reference point they become more psychologically distant. Direct experience in the here-and-now is psychologically proximal and fosters low-level construal of the salient and incidental features of objects and situations. Our dieter at the holiday meal focusing on the direct experience of taste, which is immediately accessible, along with the social pressure to eat and be merry would be experiencing low level construal. Low-level construal may be very functional in navigating our social world on a daily basis, such as knowing a venomous insect from one more benign, a poison berry from a healthy fruit, or expected behavior given the situational context. Being in conscious contact with direct experience allows one to be sensitive to subtle changes in the environment and adjust behaviors accordingly. However, low-level construal may also influence our decisional processes by focusing too much of our attention on incidental and/or peripheral details in the here-and-now, such as hedonism, causing one to lose focus of future concerns.

In the converse, CLT proposes that high level construal provides an avenue of mental travel across four dimensions in psychological distance that extend beyond the egocentric anchor of here-and-now. For example, an object might be nearby or remote in space (Fujita, Henderson, Eng, Trope & Liberman, 2006), an event may be tomorrow or at some distant future date (Trope & Liberman, 2000; 2003); an event may be very real (near) and likely to occur, or hypothetical (distal) and just as likely to not occur (Wakslak, Trope, Liberman & Alony, 2006); or, the event might be from the near perspective of individuals themselves or from the distal perspective of an

observer (Eyal, Liberman & Trope, 2008). It is this ability of mental travel across psychological distance that allows humans to think, plan, and reason about future events, such as forming hypotheses by extracting high level aspects of situations and abstractly applying them in different possible contexts. Importantly, the meanings associated with objects and situations shifts with psychological distance (Trope & Liberman 2010). In the absence of direct experience, the incidental details that give low-level construals meaning (e.g. taste, smell and social context) are not as accessible yet the essential elements that apply to a broad range of objects and situations may be accessible through high level construal. To illustrate, one planning a vacation next year may have no mental representation of the clothing that might be worn to the airport or the meal consumed before leaving, nor the sensation of wind and sun on their face upon arrival. However, the type of atmosphere desired, such as a Hawaiian beach or Colorado Mountain top, is indeed likely to be an abstract mental representation, or high-level construal. A person's desired atmosphere is not comprised of a narrow range of incidentals that are subject to arbitrary change, such as the clothing to be worn next year, but rather the essential features of a desired end state that are reliable and have broad applications. In planning a vacation, one might think broadly about a sunny beach on a tropical island, but not necessarily the exact six foot square of that beach to spread a blanket. As the incidental details become proximal (e.g. arriving on the beach) they take on new life and meaning for the individual. One's physical sensation to direct experience increases (e.g. sun is hot) and salient environmental cues begin to guide specific behavior (e.g. find shade). The goal of one's vacation is a high level construal of the desired end state, whereas the feasibility of the vacation is a relatively lower level construal (e.g. Liberman & Trope, 1998). The further away the end state on any of the dimensions in psychological distance, the higher the level of construal, and as the psychological distance nears, low-level construal may become more prominent (e.g. Liberman & Trope, 2010).

Research suggests that traversing psychological distance alters how objects and situations are construed which shifts the meanings the objects may have (Trope & Liberman 2010). These findings have been replicated in various types of situations. For example, Liberman and Trope (1998, Experiment 1), presented participants with activities to describe in either the near future (e.g. tomorrow) or a distant future (e.g. next year) scenario; in the distant condition participants broadly described the activity "cleaning the house" as "showing one's cleanliness" whereas in the near future the same activity was concretely described as a specific chore such as "vacuuming the floor." Liberman and Trope (1998) draw the connection with these findings to how people construe distant activities at a higher level in terms of the goal and near activities in lower level terms of the means. Liberman and Trope (1998, Experiment 3) also found that participants judged desirability as more important in a temporally distant condition and feasibility as more important in a near condition. Liberman and Trope (1998) propose desirability considerations pertain to an action's end state, a high level construal, which is given more weight in distant conditions as the feasibility aspects, low level construal, become less accessible over time. The shift in construal across spatial distance operates similarly with closer events promoting low level construal and farther events high level construal (Fujita, Henderson, Eng, Trope & Liberman, 2006). Fujita et al. (2006; Experiment 2) predicted and found that when something is close by in space one will hone in on incidental details and describe actions in terms of concrete details, yet when thinking about something farther away the action is described by the scope of its end. Thus, the process in which construal shifts with psychological distance, from low level contextualized and incidental details to higher level essential properties, is the same psychological process regardless of the distance dimension being mentally traversed.

Construal is a cognitive operation that may be experimentally manipulated as a mindset that in turn shifts how objects and events are appraised. Building on the concept that any action

can be construed at varying levels of abstraction, Freitas, Gollwitzer, and Trope (2004) found that by having participants describe why events transpire induces a mindset of high level construal whereas having participants describe how events occur induces a mindset of low level construal. Freitas, Gollwitzer, and Trope (2004) propose that by describing why events transpire, one must engage a higher level of cognitive abstraction to derive the action's primary purpose; for example, why does one recycle? Answering why an event is happening requires one to consider the abstract aims of recycling in general, perhaps to conserve natural resources. However, construal of the event may be shifted by posing the question: how does one recycle? Answering how an event might be accomplished requires one to use a low-level cognitive operation on action implementation, such as looking around for a recycle bin. An individual can easily form responses as to how an event may be implemented without ever considering why the event is happening. Just as easily, an individual may consider why an event should happen without focusing on the specific actions required to make it happen. Freitas, Gollwitzer, and Trope (2004) found that by giving participants an anchor such as improve and maintain health and requesting descriptions of either how or why the event transpires induced high- and low-level construal mindsets, respectively. To that end, not only can construal shift as a function of psychological distance, but construal level can be experimentally manipulated as a mindset which in turn will shift subjective appraisals of objects and events, and does so consistently across a wide variety of judgment and decision making tasks (Liberman & Trope 2010).

Construal Levels and Self-Control

A self-control process requires one to have a distal motive, conceptualized as a goal. In order to conceptualize a psychologically distant end state requires one to employ high-level construal, or cognitive abstraction. High-level construal allows one to derive the essential core and/or goal relevant features and mentally apply these core essentials across a diversity of distant

objects and events. In the instance of formulating a diet goal, our dieter may never be able to specifically identify each individual product that is either healthy and goal congruent or unhealthy and goal incongruent. In addition to the numerous specific objects that our dieter will encounter over time are numerous social situations; it could be a holiday meal, movie theatre, football game, or trip to the mall. Each situation has a different social context and stimuli at a specific level. However, high-level construal allows the dieter to form fewer broad categories based on essential properties and when an object or situation meets the prerequisite parameters in the mental category, it falls in that slot. In this way, not only are mental categories constructed on core essential features that help in defining the goal, but objects and situations are evaluated as being goal congruent or not based on these same essential properties. Our dieter in high-level construal would not be processing the choice between a Snickers and a Butterfinger at a football game, but rather would evaluate these objects on their core essentials (health benefit) as being incongruent with a desired end state separate and apart from the immediate social context. Conversely, a dieter in low-level construal focused on the here-and-now may base the evaluation on salient and incidental details such as packaging and/or a proximal motive such as taste and be further influenced by the social context.

Central to the present thesis is prior research on the relationship between subjective construal levels and self-control. Construal level theory predicts that high-level construal should enhance self-control. Research supports this prediction. For example, Fujita et al. (2006; Experiment 1) found those induced into high-level construal weighted high-level features and performed better in situations of conflict between high-level and low level aspects of an activity over those induced into low-level construal. Importantly, Fujita et al. (2006; Experiment 2) found that once high- vs. low-level construal was induced, the shift in construal had significant effects in an unrelated self-control situation with behavioral consequences. As evidence, the authors found a

behavioral baseline for participant's subjective ability to hold a handgrip closed and then induced either high- or low- construal with a written task, and then gave these participants the goal of holding the handgrip closed a second time purportedly to provide more accuracy in a personality test. Participants in high level construal held the hand grip closed significantly longer than their baseline measurement which suggests high-level construal advanced the motive of performing well on the personality test over the proximal discomfort. Furthermore, Fujita et al. (2006; Experiment 4 & 5) demonstrated that the effect of construal was moderated by whether people had a goal or not. The authors had student participants report study goals then experimentally induced construal level mindsets before rating temptation words positively or negative. As predicted, those with a goal in high level construal made negative evaluations of temptation in a self-control situation whereas those in high level construal with no goal rated these same temptations positively. The present question of interest is grounded in such prior research that evidences the interaction between subjective construal and goals that systematically influences self-control situations with a behavioral consequence.

Present Research

Although research delineated above suggests that high-level construal indeed promotes self-control, the specific mechanisms for this effect are less understood. One possibility is that high-level construal promotes self-control by changing what people attend to (e.g., visual attention). In contrast, low-level construal may direct attention to salient and incidental features of objects which in turn may impair the self-control process and lead to failure.

Method overview. To test the impact CLT has on attention during self-control situations, we pre-surveyed a group of participants for diet goals and had them enter a testing room filing past immediately accessible foods. Participants were induced into either high- or low-level construal then presented with pairs of foods and asked to indicate the food they would most like to

immediately consume. The choices were made on a computer that displayed images of healthy and unhealthy food items blinking on and off for different lengths of time on different sides of the screen. The objective was to force participants to shift attention back and forth between the objects displayed, however one item was displayed three times as long as the other. Using this same paradigm with snack foods, Armel, Beaumel, and Rangel (2008) found people attend more to the stimulus displayed for longer durations and were more likely to choose to eat that food. This experimental design allowed us to bias attention in a self-control situation with an actual behavioral consequence rather than a hypothetical outcome. We expect those in low-level construal to be sensitive to the bias and choose to eat the item displayed at the longer time, even when that item is incongruent with a reported goal. This effect would follow the CLT perspective that those in low-level construal, even with a distal goal, are focused on the here and now and influenced by momentary salience. Conversely, the effects of high-level construal would be moderated by a diet goal, meaning these individuals would not be sensitive to the attention bias as demonstrated by choosing to eat the healthy option even when displayed at the shorter time. In sum, attention shifts with behavioral consequences would be a function of subjective construal level. However, we make no predictions for those without dieting goals as these individuals would not be presented with a meaningful self-control conflict.

Method

Pilot Study

To ensure that food items were both liked and universally considered healthy or unhealthy, we piloted 184 food items. All food items were opened or sliced and then photographed such that packaging and peels did not obscure contents. Those images included positive junk foods (e.g. Reese Cups; Plassmann, O'Doherty, & Rangel, 2007) and health foods (e.g. apples; Hare, Camerer, & Rangel, 2009). To supplement the stimuli pool, we included food items from local grocery stores and campus dining areas to ensure participants were provided stimuli readily

accessible in their daily lives. The images were displayed in a survey using Qualtrics. Participants (*N* = 387; 245 female) were incoming freshmen at The Ohio State University that each rated 20 randomly selected foods on how much they liked them (1= not at all to 6 = very much), how healthy they were (1 = very healthy to 4 = very unhealthy), and how easy it was to determine how healthy the items were (1 = very hard to 4 very easy; Appendix A). The objective was to identify healthy and unhealthy food items that were a) not disliked; and b) were readily perceived as healthy or unhealthy. To this end, we eliminated any food items that had an average liking rating below 3 as well as any items that had an average "ease of health determination" below 2.4. Food items that had an average unhealthy rating above 3.25 were categorized as unhealthy and items averaged below 2.7 categorized as healthy (items in between were eliminated). This left a stimuli pool of 108 items total: 39 healthy and 69 unhealthy items. (Appendix B).

Participants

One hundred and fifty nine undergraduate students (89 females) at The Ohio State University participated for partial completion of an introductory psychology course requirement. Two participants did not complete the critical trials and were eliminated from further analysis.

Materials

Quantifying diet goals. As a sign-up requirement, participants had to complete an online pre-survey to assess dieting goals (Appendix E). The pre-survey had to be completed at least 48 hours prior to reporting to the lab for the actual experiment. Participants rated how careful they are about what they eat, how important diet is as a goal, to what extent they eat high-fat, high calorie foods, how committed they are to a healthy diet, to what extent they avoid high-fat high-calorie foods, and how important taste is over health in deciding what to eat. The ratings were on a 7 point Likert scale (1 = not at all to 7 = extremely).

Construal level manipulation. Each participant was seated at a partitioned computer station and randomly assigned to conditions of either low-level construal ($N = 76$, 41 female) or high-level construal ($N = 83$; 48 female). Construal level was experimentally induced through the how/why task, a previously validated manipulation of level of construal (Appendix D; Freitas, Gollwitzer & Trope, 2004). The "How" task has been found to experimentally induce low-level construal by presenting participants with a target behavior (e.g. "improve and maintain recycling levels") and asking them to generate either superordinate ends achieved by the behavior ("help the environment") versus subordinate means used to achieve the behavior ("buy a recycling bin"). Generating superordinate goals has been shown to induce a high-level of construal, whereas generating subordinate means has been shown to induce a low-level of construal. Once the mindset is induced, construal levels have been found to influence subsequent unrelated tasks (e.g. Fujita et al., 2006).

Attention manipulation and food decisions. Relative visual attention was manipulated using DirectRT software (Jarvis, 2010) embedded in a MediaLab program (Jarvis, Version 2010). The DirectRT software replicated the Armel, Beaumel, and Rangel (2008) paradigm of high resolution images that were randomly paired and displayed 4 ins. right or left of screen center at either 300 ms or 900 ms. The paired images repeated the blinking sequence over 6 alterations before appearing side by side with the command CHOOSE (Appendix C). On each choice set, participants saw the 300 ms displays a total of 1800 ms (1.8 s) and the 900 ms display a total 5400 ms (5.4 s), or three times as long. Participants executed choices by pressing the [z] key for the item on the left and the [/] key to select the item on the right. When a participant's response exceeded one second (1000 ms), a computer prompt to "Please try and respond faster" displayed. In between trials, the program displayed an off white 60 pt dot for 1000 ms at screen center to prevent any residual cuing to one side of the screen or other. We counter balanced by randomly

displaying right or left screen sides and display times (300 ms or 900 ms). In this manner, one quarter of the healthy images were programmed to display on the left at 300 ms, another quarter on the left at 900 ms; the third quarter on the right at 300 ms, and the last quarter on the right at 900 ms. MediaLab recorded open response manipulation checks and demographics at the end of the choice sessions.

Procedure

As participants first entered the lab, the actual food items pictured in the DirectRT program were on display but blocked from view during the critical trials. Participants were told they were helping to develop an experiment with a real and immediate consequence using new computer software. Participants were instructed in how to make choices on the computer using the left-right keys and instructed to select the image of the food they would most like to eat immediately following the computer task (see Armel, Beaumel, and Rangel, 2008). Participants were told the computer would randomly select one of their choices they must eat immediately following the computer task.

Participants evaluated 17 choice sets of healthy vs. unhealthy pairs (e.g. apple vs. Reese Cup) with the healthy item displayed at 300 ms, and 18 choice sets with the healthy item displayed at 900 ms. These trials were randomly intermixed. To mask the purpose of the experiment, we included four choice sets between healthy/healthy (e.g. apple vs. orange) and unhealthy/unhealthy (e.g. Butterfinger vs. Milky Way) options (two each) also randomly intermixed in the above healthy vs unhealthy pairs. Following these critical trials, participants were presented with 15 additional choice sets of sets of unhealthy vs. unhealthy pairs with one item randomly assigned a screen side and displayed for 900 ms. These 15 unhealthy/unhealthy choice sets allowed us to test whether the attention manipulation paradigm was indeed influencing choices. Because these trials served as a manipulation check they occurred after the critical healthy vs. unhealthy self-control

choices. However, not all participants had time to complete these trials ($N = 21$) and as such the analyses of the unhealthy/unhealthy trials are based on an N of 136. In total, 70 paired items made up 35 choice sets in a self-control situation (healthy vs. unhealthy) and 38 paired items made up 19 choice sets to mask the hypotheses and replicate the paradigm (healthy vs. healthy or unhealthy vs. unhealthy).

Results

Diet-Goal Pre-Survey.

To get a measure of dieting goals, we averaged the scores on 6 diet questions ($\alpha = .94$). We then conducted a median split (median = 4.17) to distinguish between those reporting dieting goals ($N = 86$) from those not reporting dieting goals ($N = 71$).

Primary Analyses.

To test the interaction of construal, attention, and dieting status, we conducted a 3-way repeated measure ANOVA with two between subject factors (construal level and diet goal status) and one within subject factor (whether the healthy food was displayed at 300 ms or 900 ms) predicting the number of healthy items that were chosen. Contrary to our hypothesis, this 3-way interaction was not significant ($F(1, 153) = 1.00$, $p = .32$). Additionally, there were no main effects of diet goal status ($F(1, 153) = .005$, $p = .95$) or attention manipulation ($F(1, 153) = .86$, $p = .36$). Because we make our strongest predictions for those reporting a diet goal in our sample, we conducted a 2-way repeated measure ANOVA with dieters only on construal levels across healthy decisions (whether displayed at 300 ms or 900 ms). This analysis found no significant interaction ($F(1, 84) = .33$, $p = .57$; see Figure 1) nor any significant effect on display time ($F(1, 84) = .54$, $p = .47$) or construal level ($F(1, 84) = .43$, $p = .52$).

Replicating the Paradigm

Because our primary hypotheses were not supported by the data, we conducted some exploratory analyses to determine what went wrong. We first analyzed the unhealthy/unhealthy choices to test the influence of the attention manipulation. If the paradigm is working, we would expect participants to be choosing more items displayed for 900 ms than items displayed for 300 ms. We used the 19 unhealthy/unhealthy choice sets that 136 participants completed. For each participant, we added up the number of times they chose the item displayed at 900 ms and divided the sum by the total number of choices, resulting in a proportion of items chosen at 900 ms (M = .51, SD = .24). We then conducted a one sample t -test to find this proportion did not differ significantly from 50% ($t(135) = .72$, $p = .47$; see Figure 2). Additional analyses revealed that this result was not influenced by construal level, dieting goals, or the interaction of these variables. Therefore, it appears that the attention paradigm failed to influence choices of our participants.

Liking Ratings on Stimuli

Another concern we had was that our healthy foods were more desirable as compared to our unhealthy foods. Indeed, in the critical trials that paired healthy vs. unhealthy food, we analyzed the proportion of healthy items chosen when displayed at 300 ms (M = .59, SD = .21) and found that overall participants chose healthy foods significantly more often than unhealthy foods ($t(156) = 5.12$, $p < .001$). In analyzing the proportion of healthy foods chosen when displayed at 900 ms (M = .60, SD = .21) the healthy item was again chosen significantly more ($t(156) = 5.8$, $p < .001$). To further investigate the possibility that our healthy items were more desirable than our unhealthy items, we revisited our method of stimuli selection. In particular, we had assumed that by selecting items above the midpoint on liking would yield groups with roughly equivalent liking ratings. However, we found that the healthy stimuli pool (M = 4.36, SD = .76)

were rated as significantly more liked than the unhealthy stimuli ($M = 3.55$, $SD = .52$; $t(82) = 5.73$, $p < .001$; see Figure 3). This suggests that the overall healthy stimuli were also the tastier options.

Discussion

We had expected those in high level construal to be less sensitive to the attention manipulation relative to those in low level construal. Much to our surprise, we found that construal levels did not impact the choices that dieters made in our biased attention choice task. We propose several explanations for the lack of findings. First, our results indicate that we failed to replicate the effects of the relative visual attention manipulation used by Armel and colleagues (e.g. Armel & Rangel, 2008; Armel, Beaumel, & Rangel, 2008; Rangel, 2009). As our theory was couched in being able to manipulate attention, if the manipulation failed we would not be able to make predictions. Secondly, it appears that our selection of stimuli may have biased our results. In general, people preferred the healthy over unhealthy items, a somewhat surprising result. We might speculate that healthy foods were perceived as effectively serving both the goals of hedonic eating and dieting. Because the healthy food was well liked, the unhealthy food may not have served as a desirable temptation.

The lack of support for our focus hypotheses may be further explained by aspects of the experimental procedures that may have created situational cues that influenced our participants' food preferences to a greater degree more so than their dieting goals, and/or the construal level and attention manipulations. First, we presented the fruit in the same room that we conducted the experiment. The smell of these fruits may have further diminished the degree to which participants were tempted by the unhealthy foods. Second, participants may have felt social pressure to choose healthy foods instead of the unhealthy foods, as many individuals were run at once and their decisions at the end of the experiment fairly public. This social pressure may have altered participants' food preferences. Another concern related to the inadvertent salience of fruits is that

the age cohort of our experimental group has been found to be especially sensitive to psychosocial diet practices along with being an elusive group to measure for dieting goals (e.g. Johnson, Wardle, & Griffith, 2002). Participants may have believed choosing fruits was a goal they should have and were expected to pursue.

Future Research

In spite of our results, the hypothesis that subjective construal orients attention remains plausible. Further evidence may be gathered with minor changes to the method in order to properly test our hypotheses. Primarily, the attention manipulation needs to be altered such that it actually influences simple choice behavior, or perhaps replicated prior to inducing mindsets. Additional pilot testing should be conducted to ensure the Armel et al. (2008) paradigm can be replicated in our lab prior to any larger scale studies. Secondly, the food stimuli need to be re-selected, taking care to find unhealthy items that serve as real temptations. To do this, we may need to get creative with our food choices, since the number of viable items was limited as participants found it difficult to determine the healthiness of many purported health foods (e.g. low-fat granola bars) in our pilot study. This may require not using an actual choice as our dependent variable. Many healthy foods that we could use to expand the stimulus set require some form of preparation such as being cooked or steamed, which may not be practical in a typical laboratory setting. In addition, the foods have to be readily available and common to the population being tested. Rare, unusual, or unfamiliar foods would not work well in this situation as they may inherently attract attention (e.g. Wright, & Ward, 2008). Finally, the food table needs to be in a separate room where aromas do not have the opportunity to influence motives.

Conclusion

Although we failed to realize the predicted results, pursuing the manner in which attention shifts as a function of subjective construal remains an important research question. Future research

in this direction is well warranted by the implication self-control research has on such a diversity of helping professions. In addition, construal and attention has heretofore been researched independently where a more focused and combined effort may prove beneficial to the larger scope of research on motivated social cognition.

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APPENDIX A

Qualtrics Pilot Study

This survey is on how you feel about various foods. Although there are no right or wrong responses, we encourage you to respond as accurately and quickly as possible.

I understand that my participation is wholly voluntary and that I may withdraw at any time.

- ❍ Agree (1)
- ❍ Disagree (2)

This first section of this survey is asking how much you like certain foods.

	Not at all (1)	Moderately bad (2)	Bad, but could be worse (3)	Good, but could be better (4)	Moderately good (5)	Very much (6)
In general, how much do you like to eat this food?	❍	❍	❍	❍	❍	❍

Good job! You have just completed 1/3 of the survey. In this next section the survey is asking how healthy you believe certain foods are

	Very healthy (1)	Somewhat healthy (2)	Somewhat unhealthy (3)	Very unhealthy (4)
How healthy do you think this food is as a snack?	❍	❍	❍	❍

You are doing great, 2/3 of the survey is completed. In this section the survey is asking how difficult it is to determine the healthiness of certain foods. Your response should have no consideration on whether the food is healthy or unhealthy, just on how easy or difficult it is to make that determination.

	Very difficult (1)	Somewhat difficult (2)	Somewhat easy (3)	Very easy (4)
How difficult was it to determine the healthiness of this food ?	❍	❍	❍	❍

You have done really great so far, now for some quick demographics and then we are finished. Is English your first language?

- ❍ Yes (1)
- ❍ No (2)

Health and diet concerns.

	Yes (1)	Sometimes, but not always (2)	No (3)
Is diet a concern for you? (1)	❍	❍	❍
Is health a concern for you? (2)	❍	❍	❍
Is weight loss a concern for you? (3)	❍	❍	❍

What is your gender?

- ❍ Male (1)
- ❍ Female (2)

How old are you?

- ❍ 18-25 (1)
- ❍ 26-34 (2)
- ❍ 35-54 (3)
- ❍ 55-64 (4)
- ❍ 65 or over (5)

END OF PILOT

APPENDIX B

HEALTHY STIMULI MEANS

healthy stim no.	Appendix B - Healthy Stimuli	Like	Healthy	Hard
h01	yellow apple	4.08	1.03	3.91
h02	fresh asparagus	3.80	1.07	3.70
h03	white grapes	5.38	1.08	3.92
h04	fresh peaches	5.07	1.09	3.76
h05	water melon	5.14	1.09	3.72
h06	Red Delicious apples	5.21	1.10	3.90
h07	broccoli	3.55	1.12	3.91
h08	fresh bell peppers	4.41	1.12	3.76
h09	fresh cauliflower	3.56	1.15	3.78
h10	cantaloupe	4.64	1.16	2.41
h11	strawberries	5.57	1.18	3.88
h12	kiwi	4.85	1.19	3.73
h13	fresh spinach	4.06	1.20	3.82
h14	fresh orange	5.11	1.21	3.92
h15	fresh pineapple	5.12	1.21	3.79
h16	fresh pears	4.17	1.26	3.71
h17	red grapes	5.37	1.27	3.83
h18	bananas	5.27	1.30	3.88
h19	Granny Smith apples	4.78	1.33	3.78
h20	avocadoes	3.67	1.40	3.40
h21	blue berry yogurt	4.64	1.40	3.36
h22	celery sticks	3.65	1.41	3.70
h23	peeled carrots	4.22	1.43	3.61
h24	broccoli cauliflower	4.23	1.47	3.64
h25	corncob	4.98	1.53	3.49
h26	Brussels sprouts	3.60	1.57	3.19
h27	mackintosh apples	5.36	1.58	3.76
h28	fresh cranberries	3.08	1.62	3.04
h29	raisins	3.73	1.73	3.27
h30	sweet peas	3.24	1.76	3.20
h31	Yoplait	4.26	1.79	3.17
h32	multigrain honey grahams	3.79	1.87	2.90
h33	Planter trail mix	5.03	1.92	3.25
h34	whole wheat crackers	3.52	2.03	3.05
h35	Nature Valley granola	4.23	2.10	3.02
h36	Special K nut bars	3.97	2.16	3.00
h37	water chestnuts	2.77	2.16	3.79
h38	Wheat Thins	4.70	2.21	3.05
h39	Jell-O	3.33	2.69	2.92

APPENDIX B

Unhealthy Stimuli Means

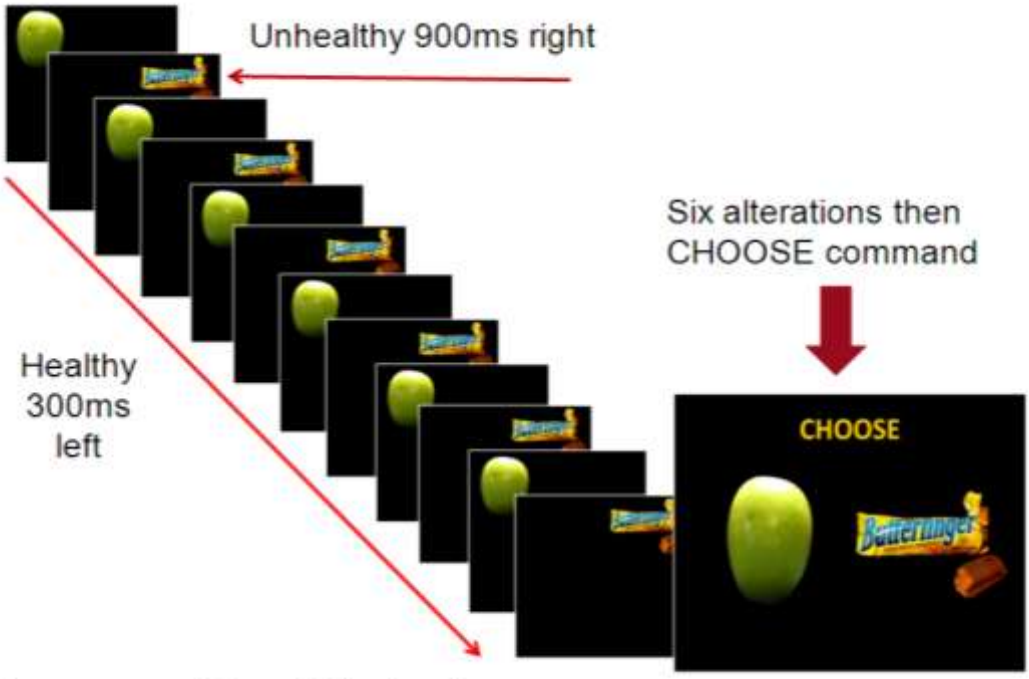
Unhealthy stim no.	Unhealthy Stimuli	Like	Healthy	Hard
uh01	red Jolly Ranchers	3.69	3.55	3.37
uh02	Twix	4.65	3.56	3.51
uh03	Kit-Kat	4.54	3.56	3.39
uh04	cherry snack pies	2.51	3.56	3.10
uh05	Sour Skittles	3.75	3.56	3.24
uh06	Reese Cup	4.11	3.57	3.55
uh07	Almond Joy	3.05	3.57	3.38
uh08	Dots	2.89	3.58	3.38
uh09	Hostess apple pies	3.00	3.58	3.32
uh10	Ho Hos	3.31	3.60	3.40
uh11	Milky Way	3.71	3.60	3.63
uh12	Famous Amos	4.09	3.62	3.30
uh13	Smart food popcorn	3.20	3.62	3.54
uh14	blue Jolly Rancher	3.79	3.63	3.48
uh15	Pringles	3.84	3.63	3.34
uh16	Three Musketeers	3.59	3.63	3.51
uh17	Flaming Hot crunchy Cheetos	3.58	3.64	3.49
uh18	green Jolly Ranchers	3.58	3.65	3.37
uh19	Chips Ahoy	4.28	3.65	3.43
uh20	sour cream Prngles	3.87	3.66	3.34
uh21	MMs	4.32	3.66	3.47
uh22	Cool Ranch Doritos	3.71	3.67	3.33
uh23	Twinkies	2.74	3.67	3.45
uh24	Hunerd Grand	3.69	3.67	3.49
uh25	Oreos	4.04	3.67	3.58
uh26	Nacho Cheese Doritos	3.89	3.67	3.65
uh27	green apl Rip Roll	3.14	3.67	3.67
uh28	choc frstd Donettes	3.37	3.67	3.72
uh29	pwdrd Dnett	3.62	3.68	3.55
uh30	crunchy Cheetos	3.68	3.68	3.58
uh31	Hostess SnoBlls	2.47	3.70	3.28
uh32	Milk Duds	3.79	3.70	3.59
uh33	Chzum Prngls	3.26	3.71	3.60
uh34	Ruffles	4.11	3.71	3.56
uh35	bana Laffy Taffy	3.36	3.71	3.47
uh36	Sweet Trt	3.40	3.71	3.38
uh37	Hostess cupcakes	3.60	3.71	3.69
uh38	Butterfingers	3.86	3.72	3.47
uh39	chrry Laffy Taffy	3.49	3.72	3.64
uh40	Whatchamacallits	2.95	3.73	3.51
uh41	Sr Patch	4.10	3.73	3.53
uh42	cffeecke	2.72	3.75	3.47
uh43	Lays chips	3.95	3.76	3.66
uh44	Funyuns	3.25	3.78	3.51
uh45	Hostess crumb Donettes	2.40	3.79	3.66
uh46	Zingers	3.26	3.79	3.70
uh47	Nerds	3.79	3.81	3.58

APPENDIX B

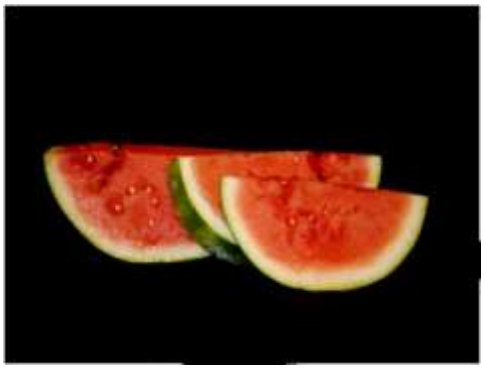
Unhealthy Stimuli Means

Unhealthy stim no.	Unhealthy Stimuli	Like	Healthy	Hard
uh48	Breyers cookies cream ice cream	4.78	3.51	3.51
uh49	Hersey bars	4.56	3.26	3.21
uh50	Häagn Das vnll almd ice crmbr	4.56	3.44	3.48
uh51	fudge stripes	4.39	3.46	3.24
uh52	Hersey Kisses	4.35	3.23	3.18
uh53	Ghirardelli	4.30	3.26	3.21
uh54	Cheeze Its	4.27	3.32	3.24
uh55	Mrs Fields	4.22	3.48	3.37
uh56	Mr Goodbars	4.20	3.45	3.39
uh57	Flavor Blasted Goldfish	4.14	3.40	3.22
uh58	hny Teddy Graham	4.11	3.00	3.02
uh59	chryvan Häagen Dazs	4.08	3.41	3.12
uh60	Nestle Crunch	4.07	3.43	3.29
uh61	Chps Deluxe rnbw	4.02	3.54	3.50
uh62	pnt MMs	4.00	3.30	3.30
uh63	Rce Krspie Trt	4.00	3.32	3.12
uh64	ice crm sandwich	3.95	3.52	3.38
uh65	sea slt chps	3.95	3.18	3.13
uh66	grpJ lly Rnch	3.91	3.37	3.09
uh67	chry Tootsie Rll Pps	3.88	3.54	3.35
uh68	Milano	3.76	3.18	3.18
uh69	choc Teddy Grahams	3.76	3.32	3.32
uh70	pudding snacks	3.76	3.24	3.18
uh71	Nttr Bttr	3.60	3.36	3.10
uh72	Baby Ruths	3.54	3.46	3.32
uh73	Tootsie Rll	3.54	3.54	3.31
uh74	Fritos	3.52	3.44	3.46
uh75	Paydays	3.31	3.18	3.00
uh76	Handi Sncks van pddng	3.23	3.17	3.04
uh77	rd lcorce	2.92	3.27	3.11
uh7	Slm Jm	2.58	3.44	3.53

APPENDIX C



Random screen side and display times



APPENDIX D
Construal Inducements

"How Do We Do the Things We Do?"

Concrete Mindset

For everything we do, there always is a process of how we do it. Moreover, we often can follow our broad life-goals down to our very specific behaviors. For example, like most people, you probably hope to find happiness in life. How can you do this?

Perhaps finding a good job, or being educated, can help.

How can you do these things?

Perhaps by earning a college degree.

How do you earn a college degree?

By satisfying course requirements.

How do you satisfy course requirements?

In some cases, such as today, you participate in a psychology experiment.

Research suggests that engaging in thought exercise like that above, in which one thinks about how one's ultimate life goals can be expressed through specific actions, can improve people's life satisfaction. In this experiment, we are testing such a technique. This thought exercise is intended to focus your attention on how you do the things you do.

For this thought exercise, please consider the following activity:

"Improving and Maintain Recycling Levels."

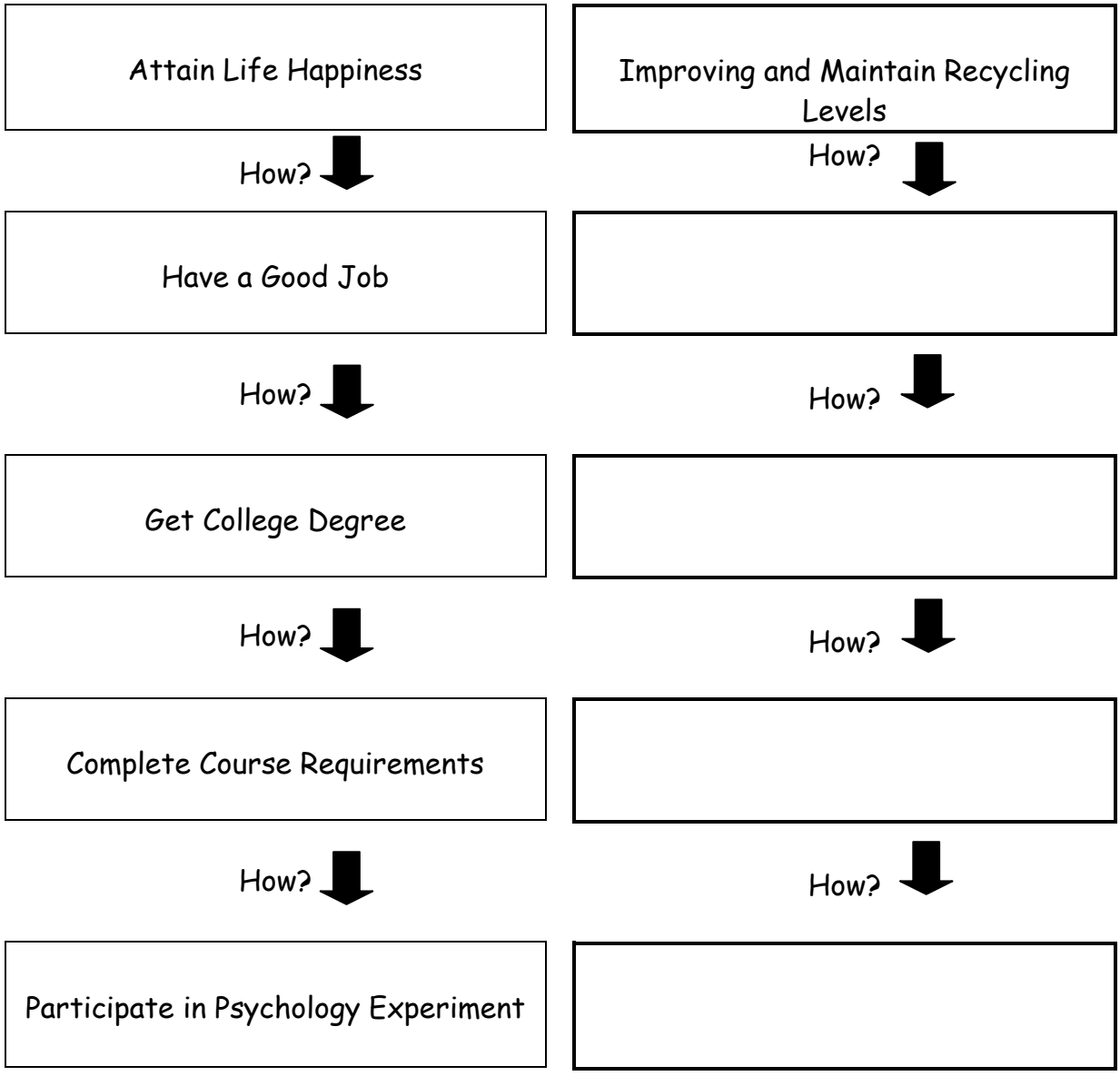
APPENDIX D continued

"How Do We Do the Things We Do?"

To show how the goal of "improving and maintaining your physical health" can be met through specific activities, please fill in the 4 blank boxes below, in the series on the right.

Beginning in the highest blank box (the one just below the box labeled "Improve and Maintain Recycling Levels"), fill in each box by answering the question "How I can meet the goal described in the immediately higher box?"

To help you with this exercise, the boxes on the left show how our example, attaining life happiness, can be linked to specific activities.



APPENDIX D continued
Construal Inducement

"Why Do We Do the Things We Do?"

Abstract Mindset

For everything we do, there always is a reason why we do it. Moreover, we often can trace the causes of our behavior back to broad life-goals that we have. For example, you currently are participating in a psychology experiment.
Why are you doing this?

Perhaps to satisfy a course requirement.

Why are you satisfying the course requirement?

Perhaps to pass a psychology course.

Why pass the course?

Perhaps because you want to earn a college degree.

Why earn a college degree?

Maybe because you want to find a good job, or because you want to educate yourself. And perhaps you wish to educate yourself or find a good job because you feel that doing so can bring you happiness in life.

Research suggests that engaging in thought exercise like that above, in which one thinks about how one's actions relate to one's ultimate life goals, can improve people's life satisfaction. In this experiment, we are testing such a technique. This thought exercise is intended to focus your attention on why you do the things you do.

For this thought exercise, please consider the following activity:

"Improving and Maintaining Recycling Levels."

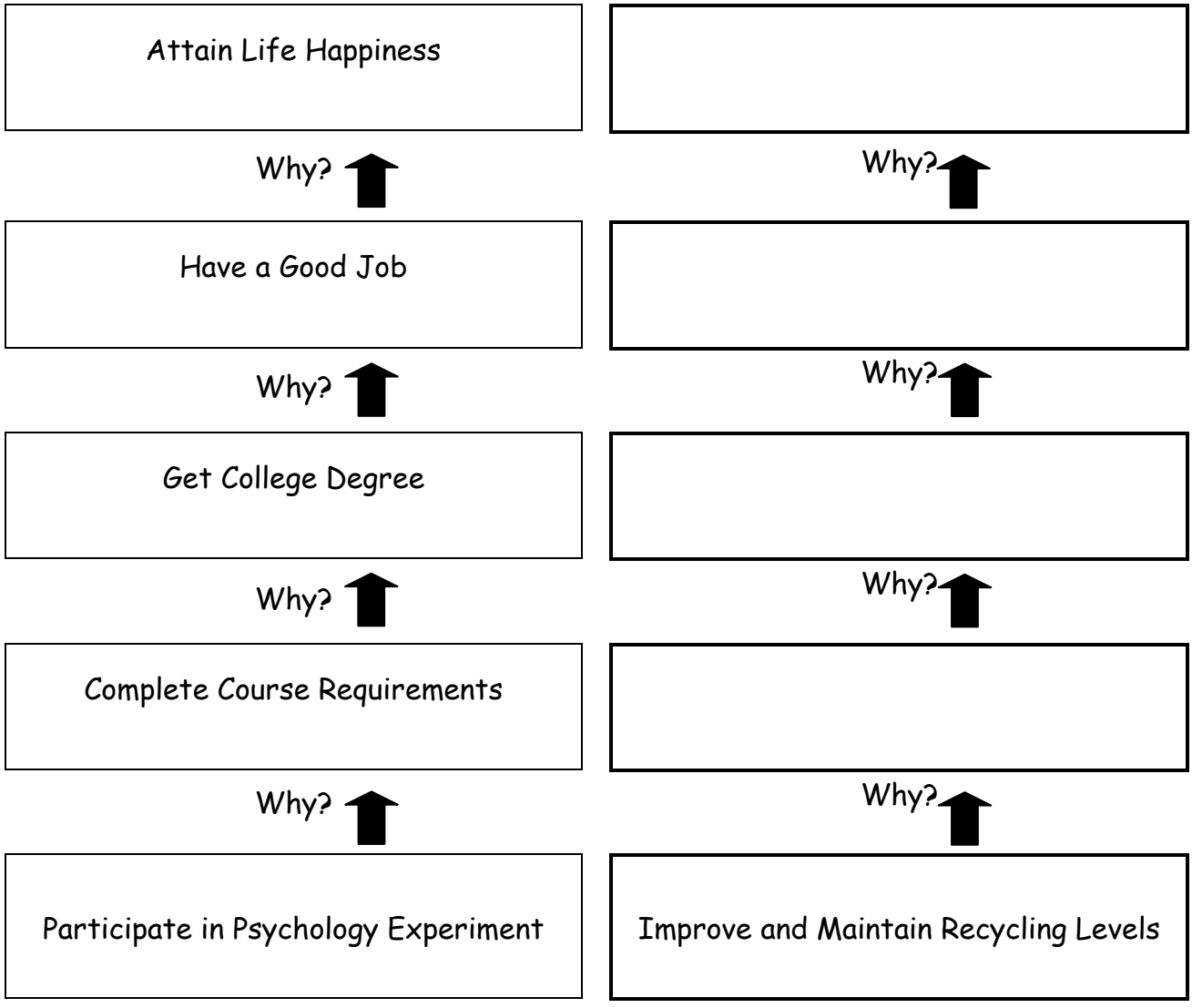
APPENDIX D continued

"Why Do We Do the Things We Do?"

To show how the activity of "improving and maintaining recycling levels" can help you meet important life goals that you have, please fill in the 4 blank boxes below, in the series on the right.

Beginning in the lowest blank box (the one just above the box labeled "Improve and Maintain Recycling Levels"), fill in each box by answering the question "Why do I engage in the behavior described in the immediately lower box?"

To help you with this exercise, the rectangles on the left show how our example, participating in a psychology experiment, can be linked to important life goals.



APPENDIX E

Pre-Survey For Diet Goal

Please use the following scales to answer questions about yourself.

	Not at all (1)	A little (2)	Somewhat (3)	A decent amount (4)	Quite a lot (5)	Very much (6)	Extremely (7)
How careful are you about watching what you eat? (1)	❍	❍	❍	❍	❍	❍	❍
To what extent is maintaining a healthy diet an important goal for you? (2)	❍	❍	❍	❍	❍	❍	❍
How guilty would you feel if you constantly ate high-fat, high-calorie foods? (3)	❍	❍	❍	❍	❍	❍	❍
To what extent do you make an effort to eat low-fat, low-calorie foods? (4)	❍	❍	❍	❍	❍	❍	❍
How committed are you to maintaining a healthy diet? (5)	❍	❍	❍	❍	❍	❍	❍
To what extent do you avoid eating high-fat, high-calorie foods? (6)	❍	❍	❍	❍	❍	❍	❍
If you know for sure that a food is healthy, how much do you care about how good it tastes? (7)	❍	❍	❍	❍	❍	❍	❍
If you know for sure that a food will taste good, how much do you care about how healthy it is? (8)	❍	❍	❍	❍	❍	❍	❍
9 (9)	❍	❍	❍	❍	❍	❍	❍

APPENDIX E continued

Pre-Survey For Diet Goal

DecideEat When deciding what to eat, which of these factors is more likely to guide your food choices?

- ❍ How good the food tastes (1)
- ❍ (2)
- ❍ (3)
- ❍ (4)
- ❍ (5)
- ❍ (6)
- ❍ (7)
- ❍ How good the food is for me (8)

Diet Are you currently trying to lose weight?

- ❍ Yes (1)
- ❍ No (2)

Diet2 To reach your ideal weight, which of the following would you need to do?

- ❍ lose weight (1)
- ❍ gain weight (2)
- ❍ neither (I am at my ideal weight) (3)

numPounds How many pounds would you ideally like to gain/lose?

Height How tall are you?

Weight How much do you weight?

Q89 I often buy pastries or cakes

- ❍ Never (1)
- ❍ Rarely (2)
- ❍ Sometimes (3)
- ❍ Often (4)
- ❍ Every chance I get (5)

Q90 I try to insure I eat plenty of fruits and vegetables

- ❍ Never (1)
- ❍ Rarely (2)
- ❍ Sometimes (3)
- ❍ Often (4)
- ❍ All of the Time (5)

APPENDIX E continued

Pre-Survey For Diet Goal

Q92 How conscious are you of what you eat?

- I eat whatever is in front of me (1)
- Rarely (2)
- Sometimes (3)
- Most of the Time (4)
- I am a very picky eater (5)

Q93 I want to improve my diet

- Not at all like me (1)
- Not much like me (2)
- Somewhat like me (3)
- Quite a lot like me (4)
- Just like me (5)

Q94 How much do you believe you can

- No Chance (1)
- Very Little Chance (2)
- Some Chance (3)
- Very Good Chance (4)

email Please enter your osu email. This is necessary so that we can make sure you have completed the pre-survey. Your responses will remain completely confidential.

END OF PRE-SURVEY

Appendix G

Screen Instructions in order displayed

Instruction #1after first construal induction:

Thank you for participating in this pilot study on judgment and decision making.

You be making choices between two food items displayed on this screen.

Each item will flash on then blink off and the other item will appear.

These two items will display alternately then appear side by side and you are to choose the item you would most like to eat following this study.

Please make your decision as quickly as possible, but also accurately since you will have to consume one of your choices at the conclusion of the computer task.

To select the item on the right press the [/] key.

To select the item on the left press the [z] key.

You will first complete a practice block to get familiar with the keyboard.

You will then complete the critical trials and finish with some quick demographics.

Press the space bar to continue.

Instruction #2 after second construal inducement:

You will now begin the critical trial.

This activity requires you to respond as quickly and accurately as possible.

Press the space bar to begin

APPRNDIX G continued

You are now finished with this task.

Choose any snack item from the table.

You will not be required to eat your snack now, you may take it with you for later.

Unless you have any further questions, ... you are free to leave.

Please exit quietly as others may still be working.

We request that you do not discuss this study with your friends and classmates,

make them come and find out what it is about like you did.

Thank you for all your hard work!

Press the space bar to exit the study

APPENDIX H
COVER STORY

NOTE: A banquet table was set up on a wall at the front of the testing room and a partition placed approximately 3 feet away such that as participants were led into the testing room they would have to form a single file between the table and the partition. They could not see the table once seated. The following instructions were uniformly given:

We are developing an experimental design in judgment and decision making, except unlike most of your other research experiences, this one involves a real and immediate consequence. We are exploring the differences in information processing between having a real and immediate consequence as opposed to a hypothetical situation. At this stage in developing the experimental design we are most interested in recording the length of time it takes to complete certain tasks. But to also keep in a real consequence, and do so in a way that is not harmful. You will be making choices on the computer between food items. At the end of the final task the computer randomly selects one of your choices that you must eat. Please start with the packet in front of you. This is a mind clearing task. Complete the first mind clearing task then go to the computer and follow the screen directions to complete the first choice session. At the end of the first choice session you then complete the second mind clearing task and using the packet number log back onto the computer and finish the second choice session. Importantly, you may withdraw from the study at any time and will still receive you Research Experience Program credit.

APPENDIX J

STUDY DEBRIEFING

It has been shown that attention influences choices, specifically, longer attention at an item makes people more likely to buy that item. We are examining the influence of mental representations on this effect. Previous experiments has shown that people can think either more abstractly and in a "big picture" manner or more concretely and in a "seeing the trees instead of the forest" manner. We hypothesized that thinking more abstractly would make people less likely to be swayed by attention.

The first task you performed in this task was designed to get you thinking abstractly vs. concretely. Previous research has suggested that asking questions of why induces more abstract thought, whereas asking questions of how induces more concrete thought. We then presented you with several choice options that varied in how long they were presented (and therefore attention). You then choose between the 2 foods. We believe that people will be more likely to choose the food that was presented for longer, except when thinking abstractly.

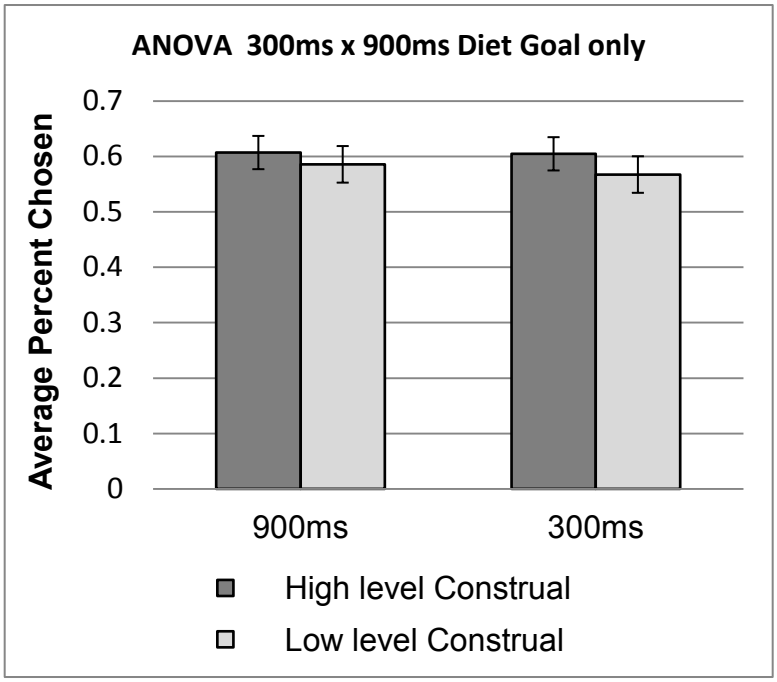
We thank you for your participation in this study. We ask that you do not discuss this study with others to maintain the integrity of the study, as it will be continuing for the next few months. We would like to thank you in advance for your help.

If you have any questions about the study, you can ask the experimenter at the present time, or email any time to Dr. Kentaro Fujita at by email at fujita.5@osu.edu, or by phone at 614-247-2751. If you believe you have a suffered an injury from participating in this research, please contact these same individuals. For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.

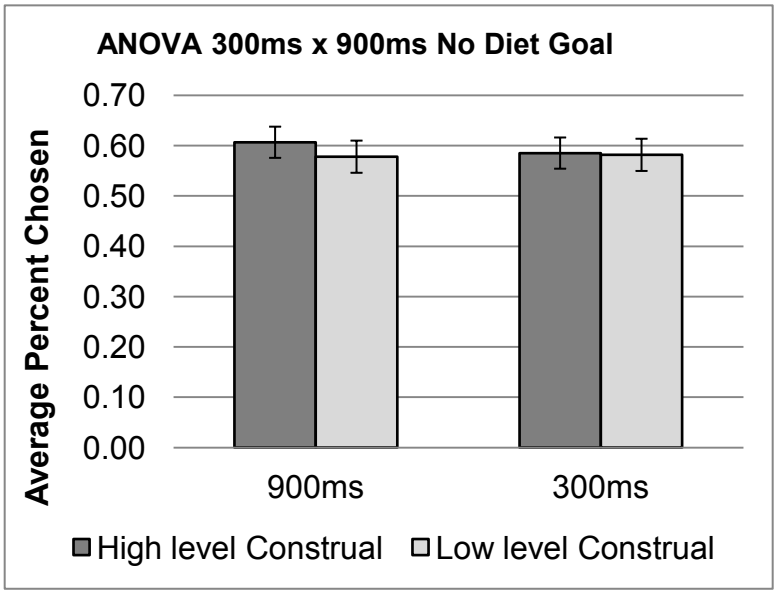
APPENDIX K

Figure 1

A

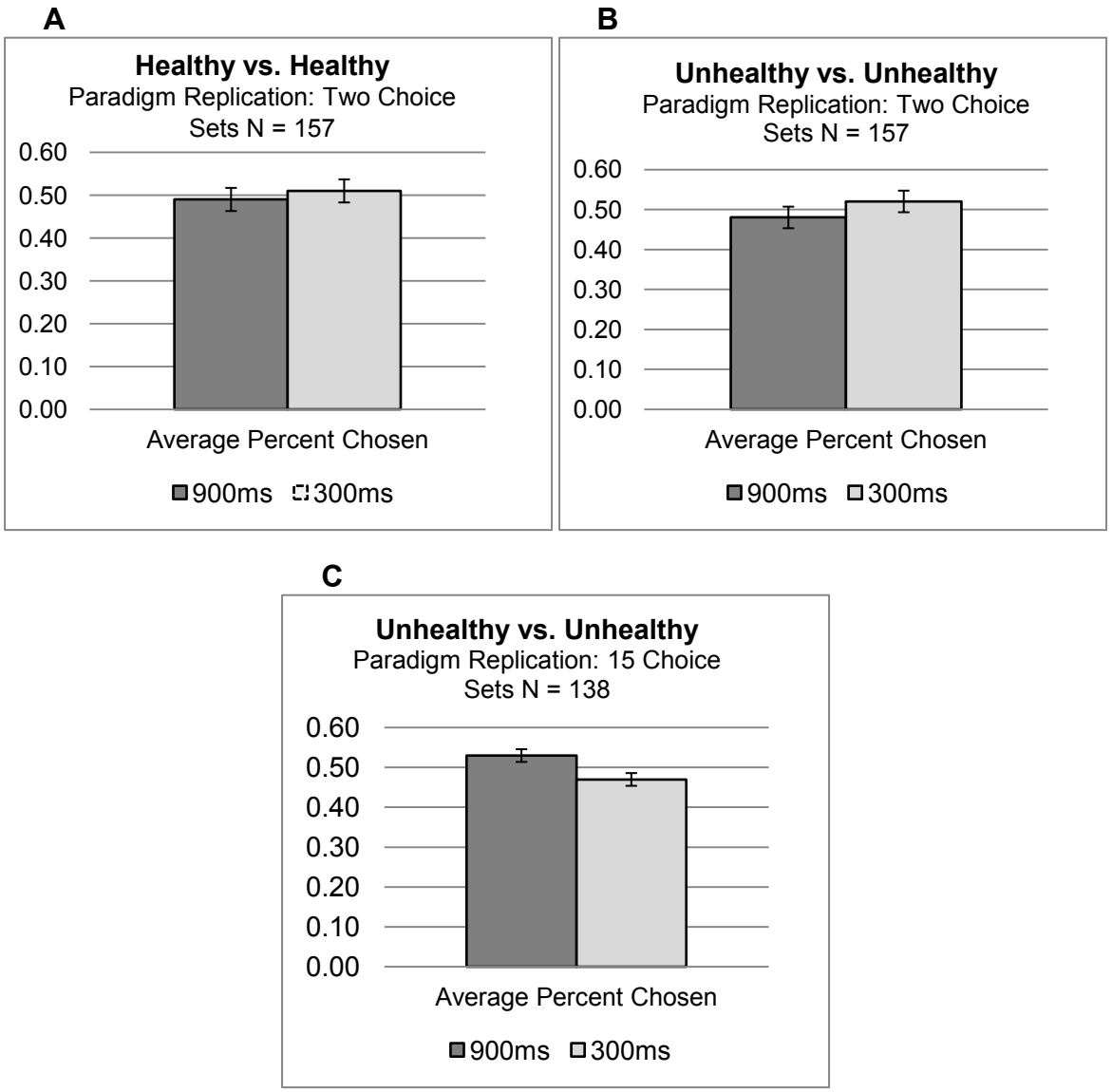


B



APPENDIX K

Figure 2



APPENDIX K

Figure 3